NINETY-EIGHTH YEAR

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NOVEMBER, 1956

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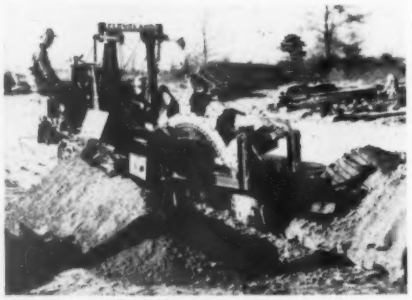

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FPC REPORT

Texas Gas Transmission Corporation has been authorized to build new facilities in South Louisiana at a cost of $783,100, to deliver gas to American Louisiana Pipe Line Company.

An additional 65,000,000 cu ft of gas per day will be made available to Northern Natural's customers, mostly in Iowa and South Dakota, and to several industrial customers, as a result of an FPC order authorizing construction of 354 miles of pipe line and addition of 18,640-hp on the company's system in the Midwest.

The 1955 edition of "Statistics of Natural Gas Companies," annual publication issued by the Federal Power Commission, is off the presses. The report includes detailed financial and operation information on individual gas companies and composite statements summarizing data on natural gas pipe line companies for the years 1945 through 1955. Some 111 companies whose operations come under the Natural Gas Act are represented in the report. Copies are available at $3.75 each, order number is FPC S-122. Write FPC, Washington 25, D. C.

Postponed indefinitely are hearings scheduled October 9 on American Louisiana Pipe Line Company's application to sell gas to American Louisiana. An application by Panhandle Eastern Pipe Line Company to abandon sale of 127,000,000 cu ft per day to Michigan Consolidated Gas Company, which had been consolidated with the other applications, was also postponed.

Gulf Interstate Gas Company has received authorization to add some $8,000,000 in new facilities to its system, which will boost design capacity 47,000,000 cu ft per day, and maximum winter overload capacity by 49,000,000 cu ft per day. The facilities include four new 3500-hp stations, addition of 3500-hp to an existing station, and 2000-hp to be added to another station.

United Fuel Gas Company has received FPC approval on a plan to build 17.7 miles of 12-in. main to transport gas from its Coco, West Virginia, compressor station to the E. I. du Pont de Nemours & Company chemical plant at Belle, West Virginia. The $845,000 line will initially carry 37,000,000 cu ft of gas per day. It has a design capacity of 78,000,000 cu ft daily.

American Gas Journal, established 1859, is published monthly except November, then semi-monthly, by The Petroleum Engineer Publishing Company, P. O. Box 1589, Dallas 21, Texas.

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Printed in U.S.A.

NINETY-EIGHTH YEAR

AMERICAN Gas Journal

GAS TECHNOLOGY — OPERATIONS — EQUIPMENT — MANAGEMENT — UTILIZATION

VOLUME 183 NOVEMBER, 1956 NUMBER 11

CONTENTS

THE AMERICAN NATURAL GAS STORY

American Natural's System Serves Five Million Customers ... 8
Dean Hale

American Natural's Top Men ... 9

Michigan Consolidated Gas Company: 815,000 Customers and Growing! ... 12

Michigan Consolidated's Top Men ... 15

Vast Expansion Program Helps Meet Growing Market ... 17

New City Gate Stations Vital To Expansion ... 19

How Michigan Consolidated Converted Three Propane-Air Systems to Natural Gas ... 20
Leo Plotkin, James Cencer, and Verne Groendal

More Gas Means More Sales Promotion ... 22
Fred A. Kaiser

Milwaukee Gas Light: Growing With Milwaukee's Economy ... 25

MANAGEMENT, OPERATIONS & MERCHANDISING

Caution Tag: New Device to Warn Against Appliance Hazards in the Home ... 29

Mrs. America Draws Top Crowds ... 31
Pat Loar

Merchandising News: *Novent sales package offered; Con Ed issues newsletter for area plumber-dealers; built-in water heaters featured in Rheem sales material; "Operation Snowflake" aims for white Christmas; Custom-built incinerators for industrial use; "Queen for a Day" promotes gas cooking.*

FEATURES

FPC Report ... 2
MCF ... 4
Merchandising News ... 31
Gas Utility Industry Calendar ... 33
Gas Utility Industry News ... 34
Gas Utility Industry Personals ... 36
Trade News ... 37
Trade Personals ... 38
New Gas Utility Equipment ... 39
New Gas Utility Literature ... 41

Advertisers Index ... 42

AMERICAN GAS JOURNAL, November, 1956, Vol. 183, No. 11. Published monthly (except November, then semi-monthly) by The Petroleum Engineer Publishing Company, 800 Davis Building, Dallas 2, Texas. Second class mail privileges authorized at Dallas, Texas. Executive and Editorial Offices at 800 Davis Building, P. O. Box 1589, Dallas 21, Texas.

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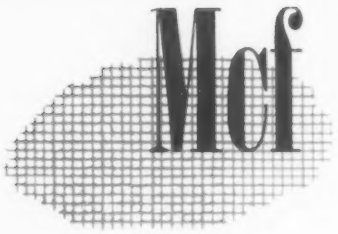

Natural gas from Mexico will be brought to U. S. consumers in the near future by Texas Eastern Transmission Company as result of a recent FPC authorization. The firm will initially purchase 115,000,000 cu ft per day near McAllen, Texas, and up to 200,000,000 cu ft per day as reserves are developed by Mexican authorities. Texas Eastern will build a new 422-mile, 30-in. pipe line from McAllen to near Vidor, Texas, to deliver the gas to its 5700-mile system.

A rosy future for the gas industry was painted at the recent AGA annual meeting in Atlantic City by the retiring president of the Gas Appliance Manufacturers Association, W. F. Rockwell, Jr. He said the gas industry will spend more than $7.3 billion in the 1956-59 period, topping by more than 50 per cent the $4.8 billion spent for expansion from 1952 through 1955. He cited growing population (207,000,000 predicted by 1986) and growing demand for residential, commercial, and industrial uses of gas among reasons for the need for expansion.

Nanaimo Gas Company, Ltd., has been franchised by the British Columbia government and the B. C. Public Utilities Commission to install a gas utility system at Nanaimo, British Columbia. Dr. Larry Givando is president of the company.

"Lucy" Ball, one of TV's most popular stars, is helping sell all-gas kitchens. AGA's Hollywood Bureau has available now a 4-column, 12-in. newspaper ad mat featuring Lucy (Mrs. Desi Arnaz) and her beautiful ALL-GAS kitchen in the Arnaz home in Beverly Hills.

Stockholders of The Brooklyn Union Gas Company, Kings County Lighting Company, and the New York and Richmond Gas Company have approved consolidation plans of the companies' board of directors. Brooklyn Union, following consolidation, will serve more than 1,000,000 customers, an increase of about 20 per cent. Approval of New York State's PSC is still required before the consolidation can be effected.

A growing crisis in American cities — the matter of garbage and trash disposal — can be met by increased use of the household gas incinerator, declares a gas industry leader. Don Winegardner, new chairman of the incinerator division of GAMA, says householders are throwing away more and more combustibles, and cities are finding it more and more difficult and expensive to haul the trash away. Gas-fired incinerators, he notes, can do the job without the air-pollution woes accompanying other types of burn-it-yourself efforts.

Consumers Gas Company of Toronto has signed a 20-year contract with Trans-Canada Pipe Lines, Ltd., for a supply of natural gas. Volumes of the gas, to be brought from Alberta via a now-underway 2250-mile line, would range from 82,500,000 cu ft per day in the first year to 165,000,000 cu ft per day in the fifth year.

An increase of 10,000,000 gas customers in the next decade has been forecast by the AGA's Bureau of Statistics. Total revenues will double in that 10-year period, the bureau estimates, soaring from $3.45 billion in 1955 to $6.89 billion in 1965. By 1965, the gas utility industry will be serving an average of 38,500,000 customers, an increase of 34 per cent from the 28,479,000 using gas in 1955.

Refusal of the U. S. Supreme Court to review a Circuit Court of Appeals decision in the so-called Panhandle Eastern Pipe Line Company case has touched off a wave of speculation over the future of the FPC gas regulation. In this case, the city of Detroit successfully appealed an FPC decision allowing a rate increase to Panhandle based on the fair field price of gas — rather than on a cost-of-production formula. The CCA didn't say the FPC had to base rates on the cost of production alone — it just sent the case back for further study. What happens now is up to the FPC and to Congress. Congress, in the next session, might pass new legislation to clarify the intent of the original Natural Gas Act, which has been broadly interpreted (and even added to) by judicial action. The FPC may be made stronger by this latest decision (or lack of it), and might tighten its procedure and become rougher with producers who haven't furnished ample "cost of production" information.

Vermont may soon get its first natural gas pipe line. Vermont Gas Corporation has asked the state PSC for permission to build a line from North Adams, Massachusetts to Pownal and on to Bennington. Vermont Gas was chartered in 1949 and took over some operations formerly handled by Central Vermont Public Service Corporation.

In Wyoming, the state PSC has ruled that a public utility can pass on to its consumers in a city any tax levied by that municipality. The ruling allows utilities to charge as operating expenses, taxes levied where a negotiated franchise agreement exists. The PSC decision was issued on a case involving Montana-Dakota Utilities Company and the City of Sheridan. The city levied a $30,000 occupation tax on the company for its operations in the city and a 1 per cent gross receipts tax on its Sheridan division franchise.

A hearing that may have far reaching importance will begin in New York on November 2. It involves a theory being advanced by public utilities that they are entitled to a profit based on replacement value — rather than cost value of their properties. The latter theory is almost universally used in public utility regulation. The case to be heard by the New York PSC is limited — it involves only the New York Central Railroad and increases in rail fares. A similar case, involving the New York Telephone Company, was turned down earlier by the PSC, but a court appeal returned it to the PSC for further hearings. While the results of the forthcoming hearing affect only New York state, a change in theory of rate base would undoubtedly bring demands for changes in the other 47 states.

Building costs continue to rise, according to the latest Dow Service Real Estate Valuation Calculator issued by the F. W. Dodge Corporation. Composite average increase for the 48 states, accruing between September, 1955, and August, 1956, is 3 per cent. Rise in construction costs is twice as great in states east of the Mississippi River, 4 per cent for the same period, while western states increased only 2 per cent.

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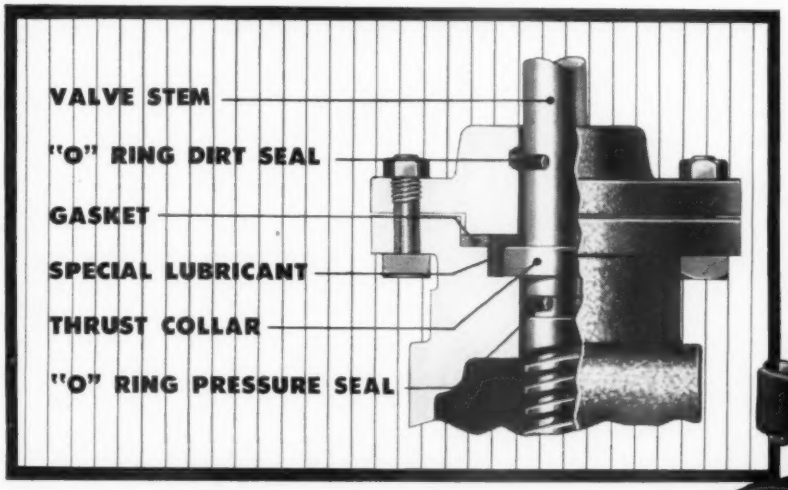

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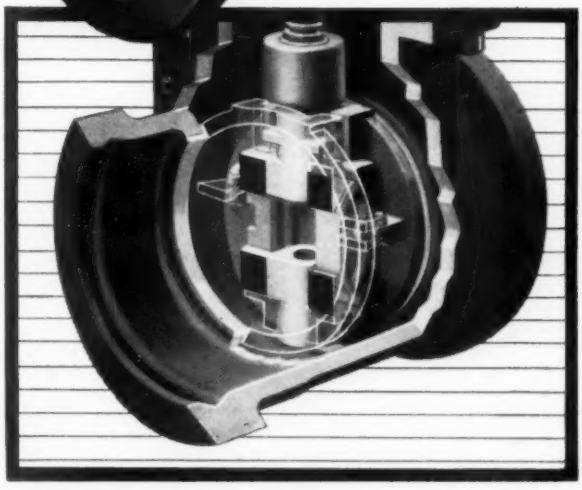

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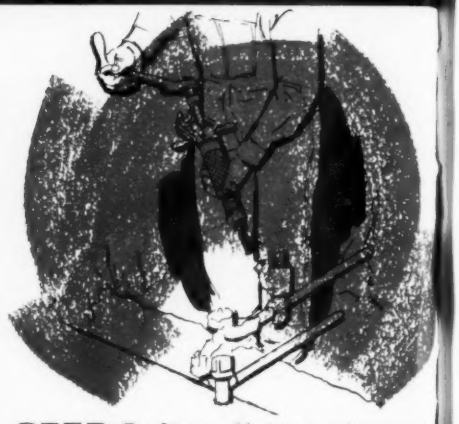

STEP 2: Stop-off. Attach drilling mach to control chamber and drill through old service li Remove machine, attach stopper, replace machine a make stop-off. Cut old service line and cap end. Inst completion plug, remove equipment and cap fitti

STEP 3: Transfer. Weld old service line to short section of line on new main. Mount control chamber and drilling machine to tee. Drill through new main. Close valve and remove machine.

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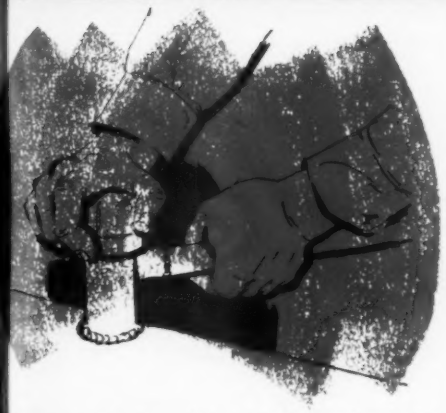

TEP 4: Complete. Attach completion plug lve to drilling machine, remount and insert into tee. ove equipment, tighten plug or valve and attach pletion cap. Transfer has been made without loss gas and without interruption to other services.

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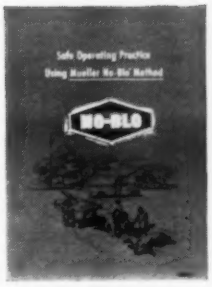

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American Natural's System Serves Five Million Customers

Dean Hale, *Editor*

AMERICAN Natural Gas Company is an integrated natural gas system consisting of two large natural gas distributing companies and two interstate gas transmission companies. Together, these companies provide natural gas for a population of more than 4,800,000 persons, and the system is now able to deliver approximately 1.75 billion cu ft of gas on a single day.

American Natural subsidiaries are:

Michigan Consolidated Gas Company, distributor of natural gas to more than 815,000 customers in Detroit, Grand Rapids, Muskegon, Ann Arbor, Ypsilanti, and over 100 other communities in Michigan.

Milwaukee Gas Light Company, which distributes natural gas to approximately 240,000 customers in Milwaukee and its environs.

Michigan Wisconsin Pipe Line Company, which owns and operates a gas transmission line extending from the Panhandle-Hugoton field in Texas and Oklahoma to Wisconsin and Michigan. The pipe line company sells approximately 80 per cent of its gas to its two affiliated distributing companies, and the remainder is sold to 14 other utility companies in Michigan, Wisconsin, Iowa, and Missouri.

American Louisiana Pipe Line Company, a natural gas transmission company, completed a new 1200-mile pipe line from southern Louisiana to Michigan in August, 1956. About two-thirds of its 300,000,000 cu ft per day capacity is sold to Michigan Consolidated at Detroit and the remainder is sold to Michigan Wisconsin Pipe Line Company.

American Natural was formed in 1901 as the American Light and Traction Company and changed its name to American Natural Gas Company in 1949.

Officers of American Natural are: President, Ralph T. McElvenny; vice president and treasurer, F. W. Sharp; vice president and secretary, Dudley B. W. Brown; assistant secretary and assistant treasurer, Parker M. West; general counsel, John Dern.

Directors include McElvenny, Sharp, Brown, Dern, William Chamberlain, Clifton G. Dyer, Henry Fink, Stanhope Foster, C. A. Johnson, Donald R. Richberg, Hubert R. Schaddelee, Richard Schaddelee, Henry Tuttle, and Ben E. Young.

The American Natural Gas Company is a New Jersey corporation with offices at 165 Broadway, New York. The company has paid dividends on its common stock each year for more than half a century. The common stock is listed on the New York Stock Exchange. Its utility property and other assets aggregate in excess of $600,000,000.

AMERICAN LOUISIANA: Newest Member of the Family is a Big 'Un

ON an almost straight line from South Louisiana to Detroit, the route of the new American Louisiana Pipe Line Company's 30-in. artery traces a path some 1000 miles long, bringing to its gas hungry, highly industrial market area some 300,000,000 cu ft of gas per day. Just barely in operation — gas started flowing in August — expansion of the big system is already underway. An additional 100,000,000 cu ft will be made available by this expansion.

Michigan Consolidated now receives 200,000,000 cu ft and 100,000,000 cu ft goes to Michigan Wisconsin for further delivery. Of the additional 100,000,000 cu ft, 55 per cent will go to Michigan Wisconsin and 45 per cent to Michigan Consolidated. American Louisiana gas has increased Michigan Consolidated's supply by 70 per cent.

Of the initial volume, 250,000,000 cu ft comes from southwestern Louisiana reserves of Superior Oil Company, Stanolind Oil and Gas Company, British-American Oil Company, and Kerr-McGee Oil Industries, Inc. Another 50,000,000 cu ft is delivered at Slaughters, Kentucky, by Texas Gas Transmission Corporation.

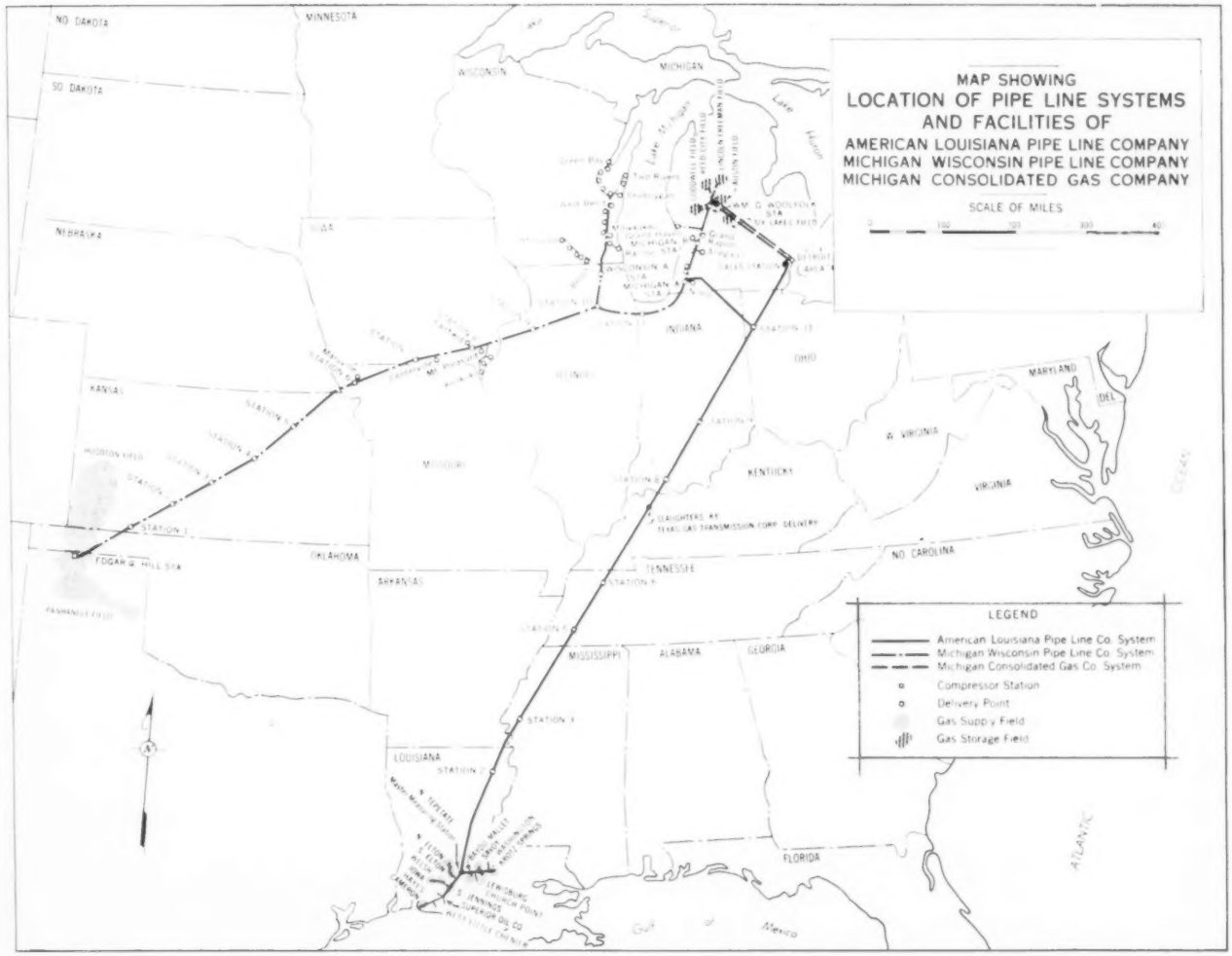
The new line is designed for an ultimate capacity of 550,000,000 cu ft. Ford, Bacon & Davis, Inc., New York, were engineers for the system design. Three stations make up the initial compressor requirements, with 10,000 horsepower installed in each (five 2000-hp units).

(Details on the transmission facilities are given in the November 1956 issue of The Pipeline Engineer, companion gas transmission and pipe line publication to the American Gas Journal.)

General offices of American Louisiana are in Detroit, Michigan. Division offices for the pipe line and compressor departments are at Muncie, Indiana; Jackson, Tennessee, and Monroe, Louisiana. The pipe line has three divisions, each with three districts.

Communications for the system is provided through a three-circuit network leased from the Bell System. Two of the circuits provide regular full period telephone service, one connecting all pipe line warehouses and division offices with Detroit headquarters.

Another circuit connects all compressor stations and the master purchase station with Detroit. The third circuit is a full period mobile radio circuit, used by all departments.



American Natural's Top Men Represent Wealth of Experience

WHEN Ralph T. McElvenny was elected chief executive officer of American Natural Gas Company in April, 1954, he took over the responsibility for guiding the company and its subsidiaries that had been the domain of the late William G. Woolfolk since 1932. McElvenny had been prepared for this task by education, experience, temperament, and physical tenacity. How successfully he has carried out this responsibility is now a matter of record.

Today, the American Natural System is in a period of great expansion. It it not only meeting all the needs of its markets, but is already in the process of additional expansion to provide future requirements.

McElvenny is a composite of financier, lawyer, tireless utility executive, and outstanding athlete. These attributes seem to come naturally to the soft spoken executive who graduated from Stanford University in 1930 with the degree of Juris Doctor, highest scholastic honor in legal jurisprudence.

McElvenny

His early financial training started with the Guaranty Trust Company in New York. In 1933-34 he served as National Bank conservator with the Treasury Department supervising the affairs of various banks which had been closed during the Bank Holiday. He moved on to the Securities and Exchange Commission as an attorney and administrative officer in the Public Utilities Division.

He entered the utility business in 1945 with the old United Light and Power Company. UL&P later broke up its holdings and emerged as the American Light and Traction Company, which became American Natural Gas Company in 1949. McElvenny learned more about the utility business from

Chairman Woolfolk under whom he served as financial vice president and assistant.

Elected executive vice president of American Natural in May, 1952, he became president in September, 1953, having been chosen executive head of the company following the death of Woolfolk. McElvenny is also chairman of the board of Michigan Consolidated Gas Company, Milwaukee Gas Light Company, and Milwaukee Solvay Coke Company. He is chairman of Michigan Wisconsin Pipe Line Company, and American Louisiana Pipe Line Company. All are subsidiaries of American Natural. He has also served on the board of directors of a number of other utility companies and is presently a member of the board of the National Bank of Detroit, United Foundation, Detroit Symphony, and board of trustees of Kalamazoo College.

Although a prodigious worker at his desk, at the conference table, and on the long distance telephones, McElvenny has not neglected the recreational side of his life.

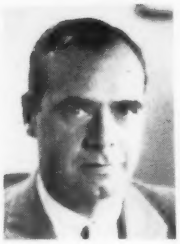
Appearing even younger than his 50 years, he is a tough competitor on the tennis courts, where he was national inter-collegiate doubles champion at Stanford in 1928. He was National Public Parks doubles champion in 1936 and played first doubles for the United States against Canada in the annual Gordon Cup competition for senior teams in 1953. He also enjoys hunting, fishing and golf.

His sense of fair play on the tennis courts extends to his business. It is his firm philosophy that a holding company must be of benefit to the public as well as the stockholders to justify its existence.

He proved this through the construction of the American Louisiana Pipe Line, which has meant more gas at low rates to the millions of people in Michigan and Wisconsin at a total expenditure of $250,000,000. A small company could never have accomplished such a task, especially when one considers the years spent in preparation, hearings, and litigation before the pipe line became a reality.

McElvenny has found many other rewards in life. He married the attractive Elisabeth Steiwer, whose father was U. S. Senator Frederick Steiwer of Oregon. Their daughter Alice, 21, is a senior at Vassar, and daughter Elisabeth, 18, has followed her father's footsteps to Stanford. Ralph, Jr., 14, is a student at Detroit University School. The McElvennys live in Grosse Pointe Farms, Michigan.

Fink



Dern

Brown

Sharp

Vice president and treasurer of American Natural Gas Company is **F. Wayne Sharp,** who joined the system in 1944 as first assistant treasurer. He is also a director of the company.

Sharp graduated from the University of Illinois in 1926, and is a certified public accountant. He served as a specialist on public utility matters with Arthur Anderson & Company from 1926 until 1944.

He was elected treasurer of American Natural in 1945 and was named a vice president in 1949. He is also vice president and treasurer, and a director of Michigan Wisconsin Pipe Line Company and American Louisiana Pipe Line company, and is a director of Milwaukee Gas Light Company.

Dudley B. W. Brown, vice president and secretary of American Natural Gas Company, began his career with the American Natural Gas system in Milwaukee in 1949.

He served there as vice president, executive vice president and president of Milwaukee Gas Light Company until 1955, when he was elected to his present post.

Brown is a graduate of Harvard College and Harvard Graduate School of Business Administration. He was with the U. S. Department of Agriculture until 1936, when he went into the sugar industry. He was first elected a director of American Natural in 1939.

He has also served in various executive capacities in the aircraft industry prior to and following World War II in which he served as a commander in the aviation branch of the U. S. Navy.

John Dern, partner in the law firm of Sidley, Austin, Burgess & Smith, was born in Salt Lake City, Utah, July 26, 1903. He was graduated from the University of Pennsylvania (B. S. in Economics, 1924; LL.B. 1927); admitted to New York bar in 1927, Illinois bar in 1930. In 1949 and 1950 he served as president of The United Light and Railways Company and Continental Gas & Electric Corporation, to expedite the liquidation of those companies.

Dern is general counsel and a director of American Natural Gas Company and American Natural Gas Service Company; director of Burgess Battery Company, Burgess Cellulose Company, Carson Pirie Scott & Company, American Louisiana Pipe Line Company, Michigan Consolidated Gas Company, Michigan Wisconsin Pipe Line Company, Milwaukee Gas Light Company and Milwaukee Solvay Coke Company; trustee of the University of Pennsylvania, and member of the American, Illinois, and Chicago Bar Associations.

Henry Fink, president of Michigan Wisconsin Pipe Line Company and American Louisiana Pipe Line Company, is an engineer with more than 41 years' experience in all phases of the gas business.

During the past 21 years he has served the American Natural Gas system in many important management capacities. He was president of Michigan Consolidated Gas Company from 1946 to 1952. He served as president of American Natural Gas Company from 1948 until 1953 and has been president of Michigan Wisconsin Pipe Line Company since May, 1948. In 1953 he was elected president of American Louisiana Pipe Line Company.

Fink is also a director of the parent American Natural Gas Company and is a director of all American Natural system companies.

Wilber H. Mack is secretary, vice president, general attorney, and a director of Michigan Wisconsin Pipe Line Company and American Louisiana Pipe Line Company, and general attorney and a director of American National Gas Service Company. Prior to joining this group in 1952 he was assistant director of the Corporate Finance Division, Securities and Exchange Commission, Washington, D.C.

Educationwise he received an AB degree from Dartmouth College in 1932 and an LLB degree from George Washington University Law School in 1935. He was admitted to the District of Columbia Bar in 1935. From that date until 1942 he served in various legal capacities with the U. S. Securi

Mack

Frank Thompson

McClintock

Steinbaugh

Campbell

McIntire

ties and Exchange Commission. From 1942-48 he was a lieutenant commander in the U. S. Navy with the office of Naval Intelligence.

Frank W. Thompson is vice president and director of American Louisiana Pipe Line Company. He also is vice president and engineer of the American Natural Gas Service Company.

Thompson is a graduate of the California Institute of Technology with a BS degree in mechanical engineering.

His experience includes a number of years in the gas and oil fields of California. He was with the Los Angeles Gas and Electric Corporation, now the Southern California Gas Company, for six years. He also had regulatory experience with the California Public Utilities Commission.

Thompson joined the American National Gas system in February, 1950. In the American Louisiana project, he participated in the negotiations of gas purchase contracts and was responsible for the design and engineering of the project.

Robert D. McClintock, vice president and manager of construction of American Louisiana Pipe Line Company, was graduated from Colorado College in 1936 with a degree in geology and a minor in civil engineering. He was employed in 1936 by Colorado Interstate Gas Company as field engineer. He was construction superintendent of this company at the time he left their employ in 1949. In February, 1949, he joined the engineering firm of Ford, Bacon & Davis, Inc., of New York and was division engineer for the construction work being performed by that firm for Michigan Wisconsin Pipe Line Company. From October, 1949, until April, 1951, McClintock was employed as pipe line superintendent for Michigan Wisconsin Pipe Line. In April, 1951, he was appointed manager of Wisconsin operations. In December, 1953, he was elected to his present position.

Varnum B. Steinbaugh is in charge of gas supply for the entire American Natural Gas Company system.

In March, 1952, he was authorized by the board of directors of American Natural to make a survey and recommendation for the location of the new natural gas pipe line to serve Detroit and the American Natural system.

J. L. Thompson

Ross

In June the board accepted his recommendation of the Louisiana Gulf Coast as the feasible location for the origin of this line. At that time, he was authorized to purchase the necessary reserves and proceed with engineering location studies.

He supervised all gas supply purchases for American Louisiana Pipe Line Company and was general coordinator of construction for the line.

Steinbaugh has a BS degree in chemical engineering from the University of Michigan, 1921, and has been associated with American Natural affiliated companies since 1941.

Rex V. Campbell, general superintendent of American Louisiana Pipe Line Company, has had a long-time career in the gas industry dating back to 1935. In May of that year he began working for Cities Service Gas Company as a machinist. He advanced through various positions with the company and was construction superintendent of compressor stations and dehydration plants when, in 1943, he went with Panhandle Eastern Pipe Line Company as assistant superintendent of compressor stations. In July, 1949, he accepted a position with Ford, Bacon & Davis, Inc. as assistant superintendent of compressor stations in constructing Michigan Wisconsin Pipe Line. In November of that year he became superintendent of compressor stations for Michigan Wisconsin, which position he held until transferred to American Louisiana and his present job in September, 1955.

Campbell holds a BS degree in mechanical engineering from Oklahoma A&M College and is a registered professional engineer in the State of Oklahoma.

Fred H. McIntire, assistant to the president, American Louisiana Pipe Line Company, was born in Wilson County, Texas, November 6, 1914. He is a graduate of Texas College of Arts and Industries; BS and MS is physics, 1938 and 1939 respectively. He was a member of the faculty of Texas A&I 1939 to March 1941.

He served as special agent in charge of the San Antonio, San Diego, and Detroit offices, and as inspector in charge of the Inspection and Planning Section of the FBI at Washington, D.C.

McIntire resigned from the FBI at Detroit where he was serving as special agent in charge in July, 1955. He was appointed to his present position August, 1955.

J. L. Thompson, general superintendent, Michigan Wisconsin Pipe Line Company, has been associated with the natural gas industry for 23 years.

He graduated from Rice Institute in 1933, and in later years has taken graduate work at Massachusetts Institute of Technology and University of Michigan. He is a registered professional engineer in the state of Texas.

Thompson began his career in the natural gas industry in 1933, when he joined the Lone Star Gas Company in Dallas, Texas. During the 18 years he was employed at Lone Star, he was engaged in all phases of natural gas operations.

Herbert H. Ross, manager of operations, joined Michigan Wisconsin Pipe Line Company on April 1, 1956. He was previously associated with the Fish Service and Management Corporation, Houston, Texas.

Ross has rich experience in public utility operations. He is mining engineer graduate of Ohio State University, and accepted his first job as field foreman and general superintendent for the National Gas & Electric Corporation. ★ ★ ★

Michigan Consolidated Gas Company:

815,000 Customers And Growing!

MICHIGAN Consolidated Gas Company, one of the nation's largest gas utilities, distributes natural gas to 815,000 customers in 110 Michigan cities, villages and townships.

The company began operations in Detroit in 1851 as the Detroit Gaslight Company and, following a number of mergers and consolidations, became Michigan Consolidated Gas Company in 1938.

Today, Michigan Consolidated spans the state from Detroit, in southeastern Michigan, to Muskegon on the west, and Traverse City on the north.

The company is divided into nine distribution districts, a production and pipe line district, and the Six Lakes storage district.

Largest of these is the Detroit district, where 80 per cent of Michigan Consolidated's sales are concentrated. The Detroit district includes the cities of Detroit and most of suburban Wayne County, which has a total population of approximately 2,500,000 persons.

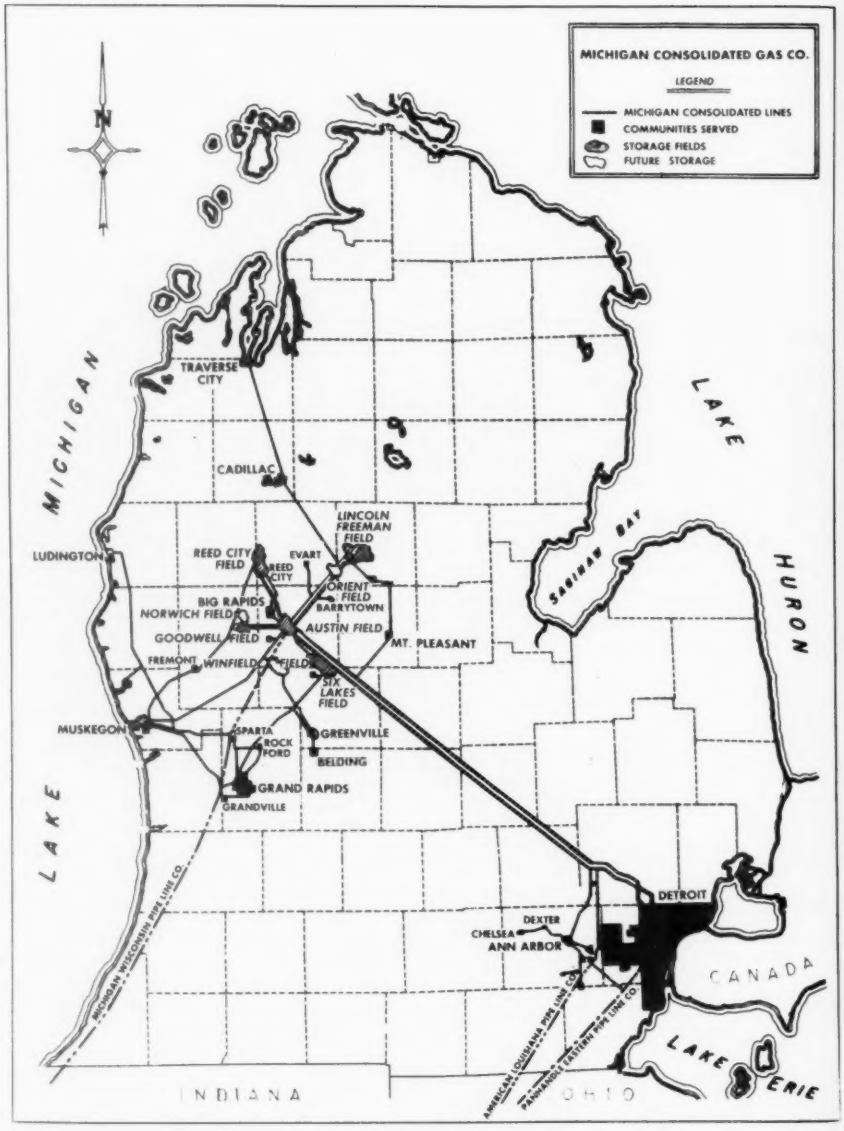
The company's Grand Rapids district includes the state's second largest city, Grand Rapids, and three suburban cities, one village, and 10 surrounding townships.

The Muskegon district is composed of seven cities and 11 townships.

Ann Arbor district covers about a third of Washtenaw County, including Ann Arbor, Ypsilanti, two smaller cities, three villages, and seven townships.

In central Michigan the company has three districts. They are Big Rapids, Greenville-Belding, and Mt. Pleasant. Each serves a number of nearby communities. Big Rapids district also includes the city of Cadillac where the company purchased a local propane-air distribution system in 1954, and converted it to natural gas last August.

Sixty miles north of Muskegon on Lake Michigan is the Ludington district, which also was converted from propane-air to natural gas in August. The company's most northern district is at Traverse City, which Michigan Consolidated purchased in July, 1955, and converted to natural gas in September, 1956.



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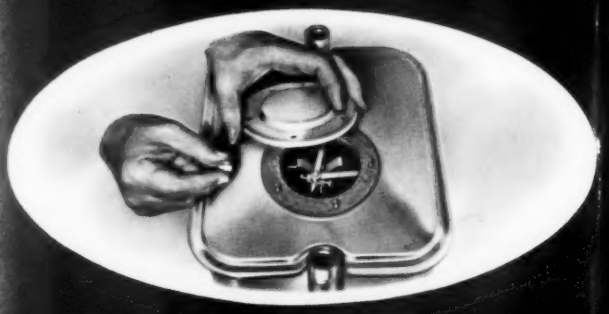

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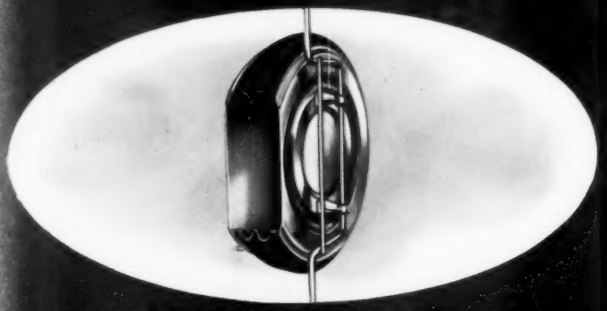

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The production and pipe line district has charge of building, operating, and maintaining the company's 800 miles of high-pressure transmission lines and local gas production.

The Six Lakes storage district includes a large compressor station and the Six Lakes underground storage field, which has a working storage capacity of 53 billion cu ft of gas.

Michigan Consolidated receives its supply of gas from three interstate pipe line companies. Two are affiliated companies in the American Natural Gas Company system. They are the Michigan Wisconsin Pipe Line Company and the new American Louisiana Pipe Line Company. While Michigan Wisconsin delivers gas directly to the company's Grand Rapids, Muskegon, and Ludington districts, most of its gas is transported to the Woolfolk station at Austin Storage field near Big Rapids. Austin Storage field and three other storage fields owned by Michigan Consolidated, are leased and operated by Michigan Wisconsin.

The Michigan Wisconsin gas received at Woolfolk station is either sold directly to Michigan Consolidated through its six pipe lines leaving the station or is stored in the four underground storage fields until required by the pipe line's utility customers.

Two 24-in. pipe lines connect Woolfolk station and Six Lakes station with Detroit. Smaller pipe lines link the stations with all of Michigan Consolidated's other districts. Michigan Wisconsin delivers 66.357 billion ft of gas a year to Michigan Consolidated.

American Louisiana Pipe Line completed its 30-in. line from southern Louisiana to Detroit in August. The pipe line delivers approximately 200,000,000 cu ft a day to Michigan Consolidated at its receiving station at Willow Run near Ypsilanti. There the gas may be channeled into Michigan Consolidated's Detroit and Ann Arbor districts or to Six Lakes storage field through the two 24-in. lines connecting Six Lakes and Detroit.

Michigan Consolidated also buys 127,000,000 cu ft of gas a day from the Panhandle Eastern Pipe Line Company. Purchases include 125,000,000 a day from Panhandle at its River Rouge station in Detroit and 2,000,000 a day for Ann Arbor.

With annual deliveries of approximately 185 billion cu ft of natural gas a year, Michigan Consolidated has an average daily supply of 508,000,000. Sendout will range from average summer day requirements of 170,000,000 cu ft to well over a billion cubic feet expected this winter. Over half these winter day requirements can be met from underground storage.

Michigan Consolidated also owns four gas fields in the same area that will be converted to storage fields as required.

The company also maintains standby facilities in its Detroit, Ann Arbor, and Grand Rapids districts. The gas generators and liquefied petroleum gas plants have an aggregate daily production capacity of approximately 133,000,000 cu ft. The company's gas storage holders have a total capacity of 61,000,000 cu ft.

In addition to converting Ludington, Traverse City, and Cadillac to natural gas this summer, the company also has extended natural gas to a dozen other communities.

During this year, approximately $35,000,000 is being spent to enlarge transmission and distribution systems, and the company expects that such large construction expenditures will continue at the present rate for at least the next four years.

Of Michigan Consolidated's 815,000 customers, more than 400,000 are space heating customers. The company is presently authorized to serve 500,000 heating customers and expects to reach this number early next year. By that time additional volumes of gas will be available to Michigan Consolidated from the American Louisiana pipe line, which plans to expand its daily capacity to 400,000,000 cu ft a day, and additional heating customers will be added.

Michigan Consolidated's main office is in Detroit. The company also has offices in all of its districts, including a number of branch offices in the Detroit area and smaller towns outstate.

Chairman of the board of Michigan Consolidated is Ralph T. McElvenny. Henry Tuttle is president, and Hugh C. Daly is executive vice president. Other officers include Roland R. Paulin, vice president and manager of operations; Fred A. Kaiser, vice president and general sales manager; Karl E. Schmidt, vice president and engineer; William A. Rhaesa, vice president and treasurer; Carter E. Shields, vice president and controller, and Ellsworth G. Reynolds, secretary. Directors include: McElvenny, Tuttle, Daly, John Dern, Henry Fink, Hubert R. Schaddelee, George A. Staples, and Ben E. Young.

Michigan Consolidated Officers

Henry Tuttle, president of Michigan Consolidated Gas Company, started his career as a service man in the shop department in 1920. He moved on to the accounting department and became first assistant treasurer and assistant secretary in 1937. He was elected vice president and controller of Michigan Consolidated in 1940 and vice president and treasurer in 1945. He was named executive vice president in 1949 and was elected president in 1952. He is also a member of the board of directors of American Natural Gas Company.

Tuttle served as a consultant to the gas planning division of the Petroleum Administration for Defense, Department of Interior, during World War II.

Tuttle also has devoted much time to civic activities. He is chairman of the board and a director of Detroit International Riverama, Inc., a member of the board of directors of the Detroit Board of Commerce, United Foundation, Detroit Convention and Tourist Bureau, Michigan Post of American Ordnance Association and Metropolitan Detroit Building Fund. He is a trustee of the Institute for Economic Education and the Citizens Research Council and a member of the executive committee of the Detroit Tomorrow Committee. He is on the advisory board of the American Red Cross, Detroit Chapter; and the Busi-

nessmen's Advisory Committee of Wayne University and finance committee of the Boy Scouts Detroit Area Council.

He is a member of the American Gas Association, Independent Natural Gas Association and the Michigan Gas Association, of which he is a past president, and is a trustee of the Institute of Gas Technology.

Executive vice president of Michigan Consolidated Gas Company is **Hugh C. Daly,** who joined the company and its affiliates as an assistart secretary in 1950. He was elected a vice president in 1953 and named to his present post in May, 1956.

A former newspaper man, Daly was in charge of the Washington Bureau of the Detroit Times following service in Europe during World War II. He is a native of Detroit and a graduate of the University of Detroit.

Daly maintained offices in Washington for several years after he joined the company. He is now directly responsible for the operations, engineering and sales departments and outstate districts of Michigan Consolidated.

Carter E. Shields, vice president and controller of Michigan Consolidated Gas Company, joined the company's general accounting department in 1920.

He was named accounting supervisor in 1926 and chief accountant in 1937. He was appointed assistant treasurer in 1939 and assistant controller in 1940. He became controller in 1945 and elected vice president and controller in 1953.

Active in the AGA, he has been a member of the accounting section since 1938 and has served on a number of committees, including chairman of the special committee on Uniform System of Accounts from 1953 to 1955.

He is a member of the Citizens Advisory Committee on Taxation for the Michigan Senate and a member of the State Taxation Committee of the Detroit Board of Commerce.

Vice president and treasurer of Michigan Consolidated Gas Company is **William A. Rhaesa,** who will observe his 30th year with the company next March.

Rhaesa started with the company as a typist in the accounting department. He was made superintendent of statistics in 1937 and chief accountant in 1944. A year later he was named assistant treasurer and became treasurer in 1949. He was elected a vice president in 1953.

Rhaesa is a member of the Economic Club of Detroit, Newcomen Society and Detroit Board of Commerce.

Secretary of Michigan Consolidated Gas Company is **Ellsworth G. Reynolds,** who graduated from the Detroit College of Law with a LLB in 1942. Reynolds took his undergraduate work at the University of Michigan and Detroit Institute of Technology.

After being admitted to the Michigan Bar and serving in the Army for nearly four years, Reynolds entered private practice in 1946. He joined Michigan Consolidated in 1948 as legal and administrative assistant to the secretary.

Reynolds became an assistant secretary in 1952, and was elected secretary in February, 1953.

Widely known throughout the gas industry, **Fred A. Kaiser** was named vice president and general sales manager of Michigan Consolidated Gas Company in August, 1955, after serving as president of the Detroit Michigan Stove Company.

Kaiser joined the stove company in 1931 as a field salesman and became sales manager in 1938 and assistant to the president in 1943. He was named a vice president and director in 1945 and president in 1954.

Kaiser is a former trustee of the Institute of Appliance Manufacturers, a former director of the Gas Appliance Manufacturers Association and past president of the Detroit Sales Executives Club. He was also elected to the "Hall of Flame" of the commercial section of the AGA.

Roland R. Paulin, vice president and manager of operations of Michigan Consolidated, joined the campany in 1926 as a cadet engineer following his graduation from Purdue University.

He has served in practically every department of the company, including manufacturing, meter shop, service shop, sales, street, and commercial. In 1949, Paulin was named assistant manager of operations and he became assistant to the executive vice president in May, 1950. He was elected a vice president in July, 1950, and became engineer in February, 1952. He was appointed manager of operations in September, 1952.

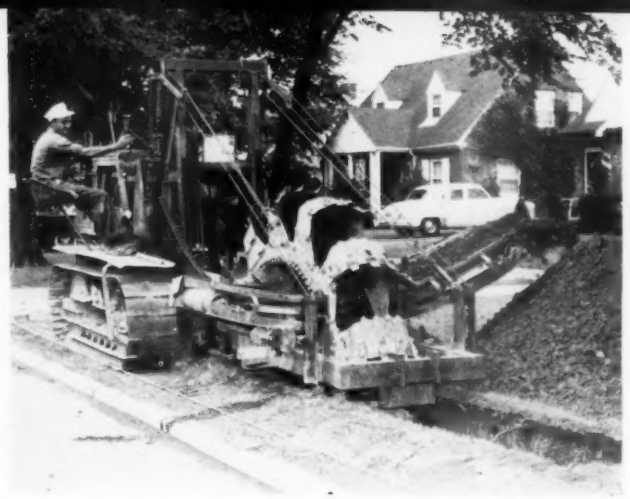
Paulin is a former president of the Michigan Gas Association and has served on the board of directors of Junior Achievement, Greater Detroit Safety Council, Michigan United Fund, and group chairman of the United Foundation.

Vice president and engineer of Michigan Consolidated Gas Company, **Karl E. Schmidt** has been with the company since 1936. He holds a bachelor's degree in mechanical engineering from Wayne University and a master's degree from the University of Michigan.

Schmidt began his career in the sales department during the conversion of Detroit from manufactured to natural gas. He transferred to the pressure department in 1941, distribution and design department in 1944.

In 1948 he moved to the engineering department. He served as a technical assistant, assistant to the engineer, and assistant engineer before being named engineer in 1952. In February, 1953, he was elected vice president and engineer.

Schmidt is a member of the Engineering Society of Detroit, AGA, ASME, NACE, ASA, and the Detroit Ordnance Association. He is on the board of trustees of Wayne University Alumni.



The lifting of restrictions on space heating made it necessary for Michigan Consolidated to enlarge its system in many areas. Here a trenching machine prepares the way for a 16-in. main to serve Detroit's east side.

Checking for holidays in the coating after backfill on Michigan Consolidated's Van Born main, two men from the engineering department walk the covered line with a Pearson detector.

$35,000,000 In New Construction

Vast Expansion Program Required To Meet Growing Market

WITH a 70 per cent increase in its supply of natural gas, Michigan Consolidated this year is constructing some 487 miles of new mains and spending nearly $23,000,000 on its distribution systems.

Of the total, 367 miles of mains are being built to serve new customers, and 81 miles are for supply improvement. The rest is divided between mains required by public improvement and for renewals. Some 27,500 new services are being installed.

In the Detroit District alone, the company is building 177 miles of mains and investing $13,300,000 in its distribution system. This figure also includes street regulator equipment, service installation, regulators, meters, and general plant structures and improvements.

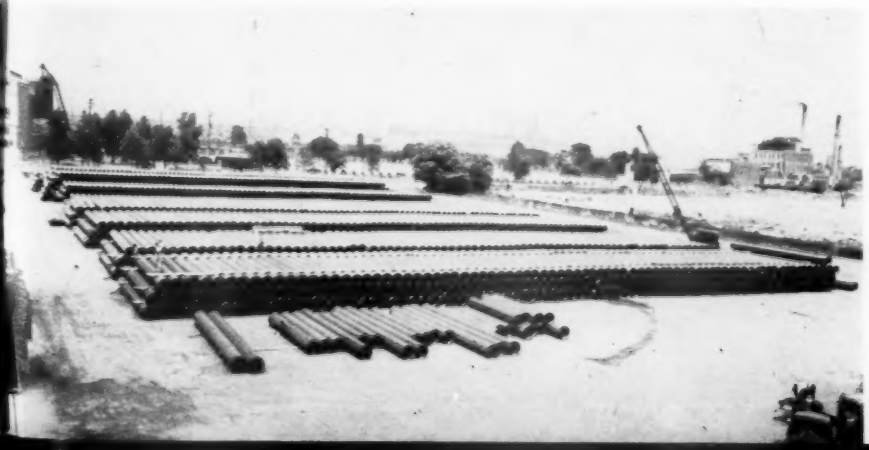
Michigan Consolidated is putting in about 34 miles of new distribution systems in the cities of Ludington, Cadillac, and Traverse City, which were converted from propane-air gas to natural gas this past summer. The company is adding about 500 services in these three cities.

Completely new distribution systems are being installed in 10 other communities across the state that are receiving natural gas for the first time this year. About 100 miles of mains and connecting 2600 services will be installed in these areas. Overall cost for the distribution systems in the converted cities and new communities is $3,200,000.

Some 173 miles of mains also are being constructed in the older outstate districts.

In Grand Rapids, the company is building approximately 88 miles of main; Muskegon, 32 miles; Ann Arbor, 42 miles; Mt. Pleasant, five miles; Greenville-Belding, six miles; and Big Rapids, three miles.

Nearly 20 miles of 30-in. pipe was stockpiled at Michigan Consolidated's Allen Road Station in Melvindale prior to the construction of the Van Born main. All pipe was coated and wrapped at station before being delivered to the job. At left in background is the company's River Rouge station and in the distance is the Ford Motor Company Rouge plant.



Major Lines

During the past 15 months, Michigan Consolidated has built approximately 200 miles of major lines at a cost of nearly $11,000,000 in anticipation of the 70 per cent increase in supply furnished by the American Louisiana Pipe Line Company.

The construction, all done by private contractors, was divided into five major projects.

Van Born Main

In 1955, the company constructed a 30-in. Van Born main to deliver gas to the Detroit district from the Willow Run Receiving Station at the terminus of American Louisiana. The main is approximately 20 miles in length. This line has six 30-in. ASA plug valves spaced about five miles apart. During construction each weld was 100 per cent radiographically inspected. The

A crew checks for holidays on the Traverse City 12¾ in. pipe line before the string is lowered into the trench.

Michigan Consolidated's 12-in. line to Traverse City gets a patching job at the end of a string. The 66-mile line serves both Cadillac and Traverse City with natural gas.

main was water tested to 760 psig, qualifying it for a maximum allowable operating pressure of 540 psig.

Muskegon Line

A 22-mile line to improve the supply of the Muskegon district was completed in 1955. This 16-in. line also now serves the Montague and Whitehall areas, added to the Muskegon district this year, and the Ludington district. This line was constructed from the Michigan Wisconsin 22-in. pipe line near the village of Sparta, Michigan to Muskegon.

The maximum allowable operating pressure on this line under the code is 850 psig. The pipe used was 16-in. OD .250-in. wall, API 5LX-42. The valves are all ASA 600 class, having a maximum allowable pressure of 1000 psig. This line has two automatic shutoff valves installed approximately 8 miles apart.

Ludington Line

In 1956, the company completed a line linking the Sparta-Muskegon line with Ludington. It consists of approximately 23 miles of 12-in. and 37 miles of 10-in. The 12-in. runs as far as Montague and then is reduced to 10-in., which continues on to Ludington. Maximum allowable operating pressure for this line is 850 psig. This line has three 12-in. and five 10-in. automatic shutoff valves.

Traverse City Line

In September this year, Michigan Consolidated completed a pipe line from Clare County, Michigan, to Traverse City. The pipe line begins at a 24-in. line connecting the William G. Woolfolk compressor station to the Lincoln-Freeman storage field and consists of approximately 30 miles of 12-in. and 36 miles of 10-in. The 12-in. line runs as far as Cadillac and the 10-in. extends from Cadillac on to Traverse City. It has a maximum allowable operating pressure of 870 psig. This line has three 12-in. and five 10-in. automatic shutoff valves spaced approximately 10 miles apart.

Milford Line

In order to store gas received from American Louisiana, Michigan Consolidated built a 30-in. Milford line, which transports gas from the Willow station to the company's two 24-in. lines running between Six Lakes and Detroit. This 25-mile pipe line was completed in the summer.

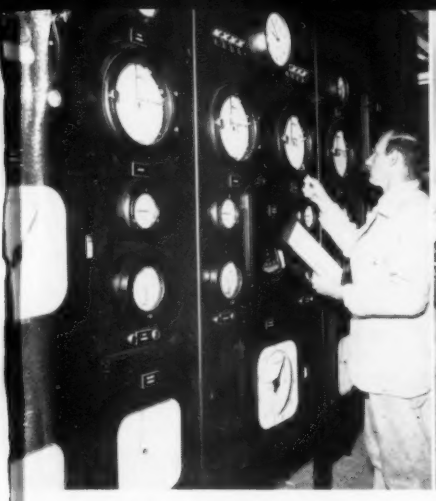
All of the lines were designed in accordance with ASA Code for Gas Transmission and Distribution Systems, ASA B31.1.8-1955, for Class I Locations. A minimum of 30 per cent of the field welds and 100 per cent of the valve assemblies, stream crossings, swamps, and railroad and road crossings were radiographically inspected.

The pipe lines to Muskegon, Ludington, and Traverse City were all tested with gas at 10 per cent greater than maximum operating pressures in accordance with the ASA Code. The Van Born main was tested with water and the Milford line was tested with air in accordance with the code.

Sommerville Construction Company of Ada, Michigan, was the general contractor on the Muskegon, Ludington, and Traverse City transmission lines. R. L. Coolsaet Construction Company of Dearborn, Michigan, built the Van Born and Milford lines. ★ ★ ★

(Left) A 40 ft section of the 30-in. Van Born main is brought into position quickly to avoid holding up traffic on city street.

(Below) The mud got pretty thick on the Ludington pipe line. Where machines couldn't move, muscles could, and the 12-in. line crossed another swift running stream.



At Michigan Consolidated Gas Company's Willow station, Steve Hutnik, pressure operator, (left) keeps constant watch on the control panel. Meters determine flow of gas into Milford, Ann Arbor, and Detroit lines. Alarm gages are set to ring a bell and alert operator in event of high or low pressure changes. (Center) Hutnik operates the gate valve on the "pig" launching trap on the Milford pipe line at the company's Willow station. (Right) New city gate station near Willow Run. From this point natural gas from American Louisiana can be directed either to Detroit markets during periods of heavy demand or to the company's underground Six Lakes Storage field.

New City Gate Stations Vital to Expansion

Willow Station. This station provides the regulating and conditioning facilities for gas received from American Louisiana prior to entering the Detroit distribution system through the 30-in. Van Born main. This station also provides facilities for transfer of gas from American Louisiana to the 30-in. Milford Line and thence to the Six Lakes Storage field. The station has a maximum allowable operating pressure of 858 psig on the upstream side of the regulation and 540 psig on the downstream side. The station was designed and constructed in comformance with the ASA B31.1.8-1955 Code.

All pipe used in the high-pressure section of the station is API 5LX. All valves in this station are ASA 600 class, having a maximum allowable operating pressure of 1200 psig. During the construction, all high-pressure gas piping was 100 per cent radiographically inspected. Upon completion, gas piping on the upstream side of the regulators was tested to 944 psig with air, qualifying it for a maximum operating pressure of 858 psig. Piping downstream from the regulators was water tested at 782 psig, qualifying it for a maximum operating pressure of 540 psig. Cost of the station was $725,000.

Other Stations. Michigan Consolidated also has constructed eight other city gate stations during 1956 at a cost of $215,000 to serve new natural gas areas. The stations are located at Ludington, Cadillac, and Traverse City, areas which were converted from propane-air to natural gas this summer, and at Montague, Morley, Stanwood, Lakeview, and Farwell, which are new service areas.

Design. All stations provide regulating, metering, and odorizing facilities. Maximum operating pressures range from a high of 975 psig at Lakeview to 325 psig at Farwell on the upstream side of the high-pressure regulators. All stations have maximum pressures of 300 psig on the downstream side of the low-pressure regulators.

Pressure relief valves are installed downstream of the high-pressure and low-pressure regulators to provide adequate protection of these facilities against excessive pressures.

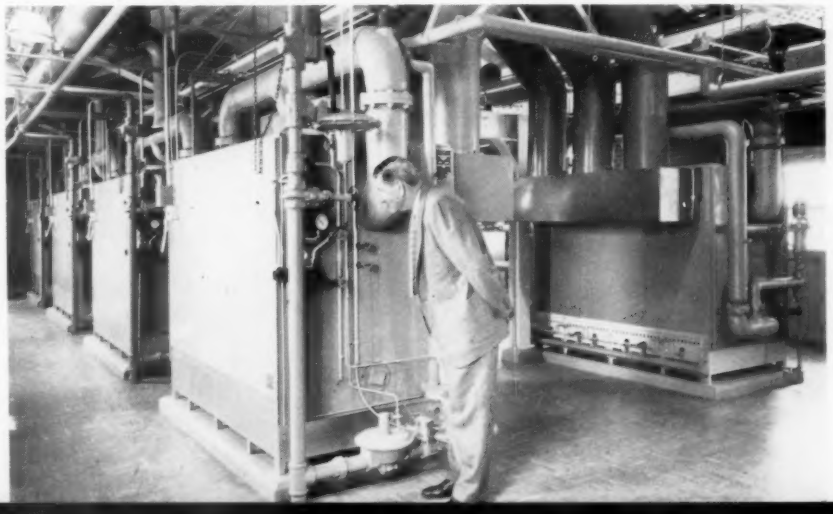
All stations are designed and constructed in conformance with the ASA Code B31.1.8-1955 for a Type B construction in a Class I location.

Valves at Ludington, Cadillac, Traverse City, and Montague on the high-pressure side of the stations are ASA 600 class and valves on the low-pressure side are ASA 300 class. All valves at Morley, Stanwood, and Farwell are 300 class and those at Lakeview are 600 class.

All welds in the high-pressure sections were 100 per cent radiographically inspected. Upon completion of the facilities, the high and low-pressure systems were tested in accordance with the code at 10 per cent over maximum operating pressures.

All of these city gate stations required sites of approximately 50 by 70 ft. The buildings were constructed of Parkersburg prefabricated sheet metal and were painted aluminum. The buildings themselves were 16 by 32 ft and were mounted on a base formed of 8-in. steel pipe. The stations were enclosed by 6 ft metal fencing.

On cold days, before gas moves into Detroit's distribution system, any one or all eight of these automatic gas fired boilers may be used to restore gas temperatures lost during regulation. Edgar A. Dick, superintendent of new Willow station, inspects pressure gage on one of eight boilers.



How Michigan Consolidated Converted Three Propane-Air Systems

Leo Plotkin, *Technical Assistant, Service Shop*
James Cencer, *Staff Engineer*
and
Verne Groendal, *Service Shop*

WITH the completion of American Louisiana Pipe Line, Michigan Consolidated Gas Company was able to convert three cities, Ludington, Cadillac, and Traverse City, from propane-air to natural gas.

Since natural gas differs in composition, specific gravity, and heating value from the 700 Btu propane-air gas distributed in Cadillac and the 800 Btu propane-air gas distributed in Ludington and Traverse City, it was recognized that some adjustment of customer appliances would be required. Laboratory tests, therefore, were made to determine suitable conversion procedures.

A brief survey of available literature indicated that no instruments or formulae are presently available that can be applied in all situations to positively determine the interchangeability of fuel gases. The literature, "Gaseous Fuels," by L. Shnidman, recommended that when approaching gas interchangeability problems, to first make calculations using the prescribed interchangeability formulae. These calculations then should be verified by selecting several appliances with burners characteristic of those generally employed in the community in question. Proposed mixtures are tested on these burners to determine whether or not the substitute gases actually can be employed successfully.

Although the characteristics of the gases themselves have a decided effect on their interchangeability, generally two gases having the same input rate factor

$$\frac{\text{(heating value)}}{\sqrt{\text{sp. gr.}}}$$

and the same primary air factor

$$\frac{(1000\sqrt{\text{sp. gr.}})}{\text{heating value}}$$

will produce the same input rate to a given burner and will inject the same quantity of primary air. Calculations of these factors for natural gas and for the propane-air gases being distributed indicated that natural gas could not be substituted directly. This was confirmed by burning natural gas on burners adjusted for the propane-air gases. The burners were over-gassed; the flames were yellow-tipped, and excessive pan blackening was evident.

More Air, Less Gas

The comparison of the calculated input rate factors and primary air factors for the propane-air gases and for natural gas indicated that a 37 per cent reduction in input and a 67 per cent increase in primary air would be required in Ludington and Traverse City to burn natural gas on burners adjusted for 800 Btu propane-air gas. Similarly, in Cadillac, a 44 per cent reduction in input and 80 per cent increase in primary air would be required to burn natural gas on burners adjusted for 700 Btu propane-air gas. The flame characteristics of the 800 Btu propane-air gas with burners adjusted as suggested above can be predicted by calculating the AGA interchangeability factors for gases above 800 Btu per cu ft.

The AGA Lifting Index, the Flashback Index and the Yellow Tip Index were calculated for the 800 Btu propane-air gas. The Lifting Index, $I_L = 0.431$, and the Yellow Tip Index, $I_Y = 1.0$, are within the satisfactory performance range determined by AGA. The Flashback Index, $I_F = 2.075$, however, is greater than 1.2, which is the upper limit determined by AGA. This would suggest that the burner adjustments required for natural gas would cause flashback if the present propane-air gases were used as "adjustment" gases.

This procedure was tested on characteristic burners and both lifting and flashback resulted. It was determined however, that when the adjustable orifice on a test burner burning propane-air gas was screwed back to obtain a visual 25 per cent reduction in flame height and the primary air increased to cause lifting and then decreased slightly, substitution of natural gas resulted in slightly soft flames. A second adjustment, increasing primary air, resulted in satisfactory flames.

Testing Burners

When natural gas was tested on burners adjusted for the propane-air gases distributed in Ludington, Traverse City, and Cadillac to ascertain that direct substitution was unfeasible, several observations were made: The burners were over-gassed, the flames had long yellow tips, and the burner air shutters were almost closed.

From these observations, it was theorized that if air was added to natural gas, it would improve flame characteristics. Natural gas-air mixtures with calculated heating values from 675 to 900 Btu were prepared and burned on test burners characteristic of those in use in the three cities. The same mixtures also were burned on similar burners adjusted for natural gas.

It was determined that an 800 Btu natural gas-air mixture produced a tolerable flame on burners adjusted for 800 Btu propane-air gas and on burners adjusted for natural gas. A natural gas-air mixture of 725 Btu was found to burn satisfactorily on burners adjusted for 700 Btu propane-air gas but with a lifting flame on burners adjusted for natural gas. Further tests indicated that the 725 Btu natural gas-air mixture could be used as an intermediate gas in Cadillac, if a second adjustment, increasing primary air, was made after the substitution of natural gas.

Other procedures were tried and other tests performed but the following two procedures appeared to be the most suitable and were demonstrated to operating and engineering personnel.

Adjustment Procedures

The first of the proposed procedures would not require an intermediate gas. The input would be reduced by screw-back adjustment of adjustable orifices, or by adapting fixed orifices. The primary air shutter openings would be increased until the flames begin to lift. The openings would then be decreased slightly. Adjustments of this type result in flames that are short and very sharp on the propane-air gas. After the sub-

stitution of natural gas, the flames become soft and a second adjustment, increasing primary air, is required.

The second proposed procedure would utilize a natural gas-air mixture, 725 Btu in Cadillac and 800 Btu in Ludington and Traverse City, as an intermediate gas. Burners would be adjusted in the same manner as in the first proposed procedure. Adjustments of this type will result in flames which are short and very sharp. After the substitution of straight natural gas, further adjustment would not be required for burners adjusted on the 800 Btu natural gas-air mixture. Burners adjusted on the 725 Btu natural gas-air mixture would require a second adjustment.

It was decided that the second procedure provided a wider latitude in adjustment, since the primary air shutter openings could be increased to a greater degree using the natural gas-air intermediate gas than with propane-air gas, and would, therefore, be used. Also, it was decided to recheck all appliances after the introduction of straight natural gas to assure optimum adjustment. This second procedure was adopted to effect the changeover with the least possible inconvenience to customers, as it permits the satisfactory use of all appliances at all times during the conversion.

Field Surveys Made

The field problems involved in the conversion of each of the many types of appliances in use in the three cities still remained to be determined. To accomplish this, it was decided to make a survey of the appliances in each city. Ten experienced servicemen from the Detroit district, selected because of their previous conversion experience and job knowledge, made the survey.

Each city was divided into sections, and a section assigned to each serviceman. Forms, individually addressed for each active account, were used to list the name and model of each appliance and the conversion material required. At the completion of the survey, the information on the forms was summarized and an accurate tabulation of required materials was prepared.

Training Conversion Personnel

After methods required for converting the appliances had been determined, the personnel for the conversion were selected and trained.

The selection was made from Detroit district servicemen, previous conversion experience and job knowledge being the major factors in this selection.

A school, complete with appliances, burners, and pilots similar to those in the conversion areas, was established to train the men. Gases, similar to the intermediate gases which would be utilized, were used during the training period. The training consisted of adjusting appliances, studying conversion methods, and reviewing the rules and regulations concerning customer inquiries. Screw-back adjustments were made with a flowmeter, using charts prepared for the conversion of the three cities. Orifice sizes were shown on input tables so that the proper size adapters would be used for converting fixed orifices. Special handbooks, containing the flowmeter charts, the input tables and other pertinent information, were printed and distributed.

Since all of the men had participated in previous conversions, a training period of only one day was required.

Formation of Conversion Crews

The entire work force required for the conversion of appliances in Cadillac, Ludington, and Traverse City consisted of a foreman, clerk and 61 servicemen. Five domestic crews, each with one leader and nine adjusters, converted appliances in residential areas.

One commercial crew, consisting of one leader and six adjusters, converted appliances in commercial and industrial establishments. One man was assigned the conversion of space heating equipment and another was assigned to the repair shop, which was equipped to repair parts that might be broken during conversion and to convert appliance components which could not be easily converted in the customers' homes.

Two men were assigned to assist any of the crew leaders having difficulty in converting special equipment. A clerk was assigned to handle necessary payroll and conversion records and to forward customer complaints to field personnel.

Introduction of Intermediate Gases

At the completion of the installation of the natural gas pipe line to Cadillac, natural gas was mixed with air by means of atmospheric inspirators. The 725 Btu natural gas-air intermediate mixture was obtained by careful adjustment, using a recording calorimeter and an indicating gravitometer to determine the Btu and the specific gravity of the mixture. The almost instantaneous response of the gravitometer permitted adjustments that resulted in a constant gas-air ratio. The pressure downstream from the inspirators was held constant at 8-in. WC. With the completion of the pipe lines to Ludington and to Traverse City, a procedure similar to that for Cadillac was used to prepare the natural gas-air intermediate mixture, except that the heating value was maintained at 800 Btu per cu ft.

Appliance Conversion

With the introduction of the intermediate gas, the appliance conversion began. Ranges with adjustable orifices were converted by a screw-back adjustment. Orifice adapters were used to convert those with fixed orifices. Most ranges were found with aluminum burner heads, some designed for mixed gases and others for LP gases. Tests had indicated that the mixed gas burner heads could be utilized for natural gas. Natural gas burner heads were used to replace the LP gas burner heads.

Cast iron port type burners were drilled or broached to a No. 38 drill size for top burner ports and to a No. 35 drill size for oven burner ports. Additional carry ports were drilled as required. On ranges with solid tops the baffles were drilled or other modifications made to increase secondary air. On Rutz-type lighter pilots, a conversion nipple, lighter tip and burner head were used.

When converting water heaters, fixed orifices were replaced and adjustable orifices were converted by a screw-back adjustment. Since pilots with pressed-in orifices could not be converted, such pilots were replaced with natural gas pilots. Space heating equipment was converted by changing the main burner orifice spud, changing B&M tips, or by a screw-back adjustment. New orifices were installed on pilots having no adjusting screw.

Hot plate, coffee urn, and steam table burners were carefully checked to determine if these burners would burn natural gas efficiently without changing the burner position. Each case required individual attention and adjustments were made as required.

Bunsen burners and dental torches, and similar equipment that could not easily be converted, were replaced.

Exceptions, Variations and Complaints

As the conversion procedure required a reduction in input, there were some instances where this reduction could not be made without impairing the usability of the equipment. Customer complaints were alleviated by increasing the input to their satisfaction even though this would cause the equipment to be overgassed when natural gas was substituted. In these cases, chiefly restaurants and industrial users, the addresses were noted and when natural gas was substituted, a call was immediately made to re-adjust the equipment.

When refrigerators were converted, the customers were requested to postpone defrosting until after natural gas had been introduced and a recheck had been made. Most customers complied

with this request and their refrigerators operated satisfactorily.

A few complaints were received from customers who had defrosted gas refrigerators during the period that the input was reduced. Those that were defrosted were unable to resume normal operation until the input was increased by the serviceman answering the complaint. These addresses also were listed and a call back was made immediately after the substitution of natural gas in order to adjust the input.

During the conversion and recheck, some customers were not at home at the time the adjuster called. The servicemen recorded these addresses on forms furnished for this purpose. Crew leaders collected these forms and forwarded them to the conversion clerk. Later, a second call was made. If still unable to enter, a card was left requesting the customer to call the company for an appointment. The work was then scheduled at the customer's convenience.

Rechecking Adjustments

After the adjustment of all appliances, straight natural gas was substituted for the natural gas-air intermediate mixture. The conversion crews then rechecked the adjustment of each appliance. Both gas and air adjustments were required on the appliances which had been left with higher inputs to avoid ignition difficulties. In Cadillac, however, a second primary air adjustment was necessary for all appliances.

Number of Customers and Meters in Use

TYPE OF CUSTOMER	LUDINGTON	TRAVERSE CITY	CADILLAC
Residential	1699	1618	546
Residential Heat	—	148	12
Commercial	96	136	72
Commercial Heat	—	15	5
Industrial Firm	18	4	1
Less Duplicate Service Customers	—	3	1
Total Customers	1813	1918	635
Meters in Use	1813	1952	635

Survey, conversion, and recheck in the three cities required 13,485 man hours for 4366 customers.

Statistics

The survey of appliances in the three cities required 900 man hours. The appliance conversion required 5000 man hours in Ludington and 5385 man hours in Traverse City. Cadillac required more time per account than the average time in the other two cities. Because of the two step process of converting the appliances, 2200 man hours were required.

The accounts by classification are shown in the accompanying table.

Survey, conversion, and recheck in the three cities required 13,485 man hours for 4366 customers. * * *

More Gas Means More Sales Promotion

Fred A. Kaiser
Vice President and General Sales Manager
Michigan Consolidated Gas Company

FOR the first time since May, 1950, Michigan Consolidated Gas Company does not have a waiting list for space heating customers. The completion of the American Louisiana pipe line has enabled the company to serve all those customers who desire gas for space heating and all other uses.

During the past six years, the company's main sales effort has been directed towards appliance sales to maintain its market. It has also cooperated with appliance dealers in the advertising and marketing of gas appliances, but has not been able to promote to any great extent increased sales of gas, although it has met new requirements of gas for domestic, commercial, and industrial use.

Now, with an ample supply of gas, Michigan Consolidated is shifting into an overall gas sales promotion program. During the past year Michigan Consolidated has taken on a total of 75,000 heating customers at various times which reduced its waiting list considerably. When space heating restrictions were finally lifted this past summer, however, there were still enough on the waiting list to keep heating contractors and the company working at capacity.

Virtually all new homes in Michigan Consolidated's service areas are being equipped with gas heating installations and will continue to be in the coming years.

The company expects that by the first of the year it will have satisfied the backlog of customers who have already indicated their desire for gas heat. At that time we will launch a more vigorous campaign to attract additional customers. The company's sales department has a number of different programs which are already in operation.

Special Sales Programs

In Detroit, for example, there are approximately 125 heating equipment jobbers servicing some 750 licensed heating contractors who are selling gas designed furnaces and conversion burners. Manufacturers of conversion burners have arranged with leading department stores and appliance chains to handle gas burner sales with installations being made by a professional installation and servicing company. Manufacturers will warehouse, deliver, install, and service for one year burners sold by department and chain stores, allowing the stores an ample profit.

Michigan Consolidated is surveying the summer air conditioning market in homes, schools, hospitals, hotels, commercial, and industrial buildings and is

The finals of the "Mrs. Michigan" contest were televised by Michigan Consolidated. Shown here is Mrs. Nila Dreger of Grand Rapids, who won the "Mrs. Michigan" competition, standing before her gas range and gas refrigerator during the local finals.

Michigan Consolidated brought last year's Mrs. America, Mrs. Ramona Dietemeyer, to Detroit to open the Detroit Builders Show. Fred Kaiser, vice president and general sales manager of the company, is standing at the left.

actively working with builders, engineers, and architects in getting this equipment specified.

Dealer, Builder Assistance

Because of restrictions on space heating during the past years manufacturers, distributors, and retailers have merchandised almost entirely without benefit of local advertising and promotional programs. They are now advertising on a limited basis but most plan large campaigns in newspapers, on radio, and television in 1957.

In an effort to assist the retailers, Michigan Consolidated operates a school to train installers and service people, provides sales training for dealer salesmen, and engineering assistance on large installations.

The company's dealer coordination division encourages dealer participation in planned promotions sponsored by various manufacturers and the company supplies display material and helps set up attractive floor and window displays.

Michigan Consolidated also works closely with the home builders in its service areas. The company was host to the Detroit Real Estate Association at its May meeting and displayed built-in gas ranges at its hospitality room.

Gas appliances also are made available to builders for use in model homes. During National Home Week, the company provided gas appliances for 38 builders. One subdivision of 400 homes features gas built-in ranges.

Michigan Consolidated is cooperating in advertising in all leading daily and weekly newspapers in Detroit and its suburbs, on radio, and TV on the promotion of this subdivision.

The company is cooperating also with another development of 700 homes which features an all gas home. The company dramatically demonstrates the advantages of gas in the home through its "Gas Versus Electric" cooking program. It is shown to all members of building organizations.

Sales Training Program

The company conducts an extensive sales training program for all sales personnel in the company. There are programs designed for each type of work, such as for the clerical force who are specifically trained at telephone usage and office procedure. This is done by training films and talks by key personnel of the sales department.

Greatest concentration is on the salesmen and personnel contacting the public directly. In addition to films and personalized cooking classes, talks by manufacturers, distributors, and sales executives are given. There is an extensive use of tape recordings to record sales talks whereby each salesman can detect flaws in his presentation.

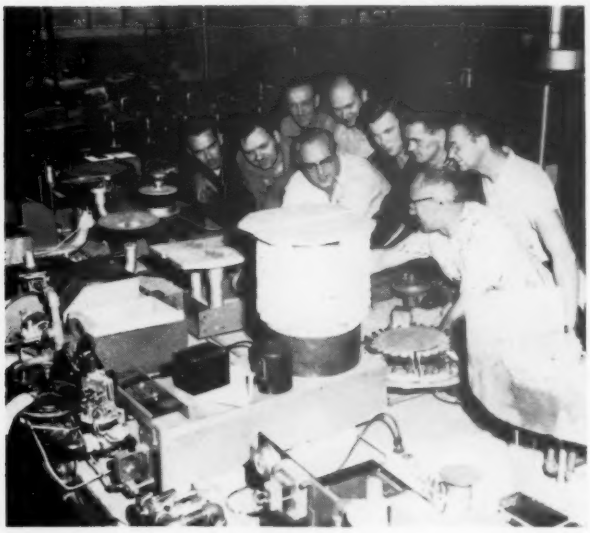
A similar program is also set up for individual appliance dealers and another program is designed for heating dealers. The company never turns down a request to help any dealer regardless of size, on his sales training work.

Michigan Consolidated's sales department issues a monthly news letter of interest to dealer and sales department employees to keep them in touch with what is going on in the gas industry locally and nationally. The letter also tells of any special promotions.

An advertising schedule for the complete month is planned so dealers can tie-in with company ads if they so desire.

The company's home service department, which operates under the sales

Some 4000 persons have witnessed Michigan Consolidated's "Gas vs Electric" cooking demonstrations in which sales department men show the advantages of gas over electric cooking.



Amid a variety of gas conversion burners, Detroit heating installers bone up on the fine points of their trade at Michigan Consolidated's dealer training school.

department, is also active in sales promotion work. This is, however, limited to the use of domestic household gas appliances. In September, the home service department in cooperation with a suburban newspaper, food stores, a dress shop and several appliance dealers put on a food and fashion fair which was a great success.

Advertising Program

In addition to normal advertising, the company's public relations department conducted an extensive publicity campaign in areas where natural gas is being introduced for the first time this year. In cooperation with the local newspapers and independent local dealers in nine cities throughout the state, the company provided special newspaper supplements acquainting the area with natural gas, gas appliances and the company. The same sort of program was carried out on radio and television.

In Detroit, the public relations department and the company's advertising agency publicity department have provided material for special gas heating editions in Sunday newspapers. The company also provides regular news releases on the advantages of gas heating to some 50 dailies and weeklies in its service area.

Prior to the conversion from propane-air to natural gas in the cities of Ludington, Cadillac, and Traverse City, a specially selected group of men from the sales department surveyed each home, commercial and industrial plant in the cities. The survey crew explained the advantages of natural gas and also left a brochure with the customer to read. The sales department, assisted by the local manager, also had a meeting with appliance and heating dealers in each city where an official of the sales department would explain the advantages of selling gas and familiarize the dealers with the company and its policies. The "Gas Versus Electric" demonstration was also performed and a question and answer session held.

In cooperation with boards of education, students and faculty groups are invited to company offices for an inspection tour. The tour starts with a welcome from a company spokesman and a demonstration on new features of gas equipment. They then visit various departments in the company and conclude with a meal prepared by the home service department.

Michigan Consolidated for the first time this past spring took part in the Mrs. America promotion by sponsoring the contest in Michigan. Publicity was placed in all state newspapers and on the company's regular radio and television programs. There was an hour telecast of the finals held in Detroit which included interviews of the contestants standing before their gas appliances. Last years Mrs. America was also brought to Detroit to open the Detroit Builders Show. The DeSoto Corporation, a co-sponsor with the AGA, also cooperated with Michigan Consolidated on publicity, press parties, and transportation.

In addition to Michigan Consolidated's regular industrial sales division, the company has also organized an industry development division. This division will work with all of the many communities served by the company in acquiring new industrial expansion in their service areas.

Teamwork is illustrated as trencher operator watches back hoe finish the trench that was started by his trencher.

Operation of trencher cutting supply main ditch is checked by operator. Dirt spills automatically to side of trench.

Milwaukee Gas Light:

Growing With Milwaukee's Economy

from heating homes to brewing beer

THE Milwaukee Gas Light Company plans expenditures of $8,500,000 during 1956 to enlarge its distribution plant and double the supply of natural gas in the metropolitan Milwaukee area.

This construction program includes the laying of about 795,000 ft, or nearly 150 miles, of new customer mains, distribution mains, renewal mains, and mains that are required because of highway improvements.

A total of 7870 new services—bringing natural gas from frontage mains along the streets into the homes and industries of customers—will be installed during 1956. Another 3500 old services will be renewed. The new and renewal services will require the use of an additional 600,000 ft of pipe.

The gas company's construction budget authorized the spending of about $500,000 a month during the first few months of the year. Expenditures mounted to a peak of about $1,000,000 a month in August and will taper back to the half million mark in December.

The new construction work will be done by the gas company and Milwaukee area contractors. Individual projects will be scattered throughout the metropolitan Milwaukee area.

One of the biggest single projects involves the construction of about 75,000 ft, or about 14 miles, of 12-in. steel line from the village of Jackson, in Washington County, to the city of Hartford. This project will cost about $600,000. The next largest project, 40,000 ft of 20-in., will reinforce natural gas service to Milwaukee's east side and to the villages of Shorewood, Whitefish Bay, Fox Point, Bayside, the city of Glendale, and the town of Mequon, Ozaukee County, at a cost of approximately $500,000.

In addition to the construction of gas mains, the company is spending large sums for new meters, meter installations, and house pressure regulator installations.

The new construction will permit the Milwaukee Gas Light Company to expand its present annual sales volume of 22 billion cu ft to 33 billion cu ft in 1956, 42 billion in 1957, and 49 billion in 1958.

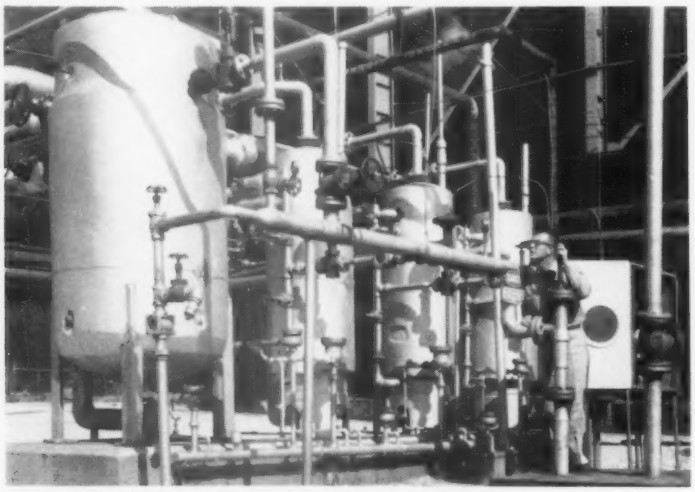
Natural gas was introduced into the Milwaukee area in November, 1949, upon completion of the Michigan Wisconsin pipe line. Although the capacity of the pipe line has been greatly expanded since then, the demands of Milwaukee Gas Light Company customers have far exceeded the supply of natural gas.

The company has been operating under a series of restrictive orders of the Public Service Commission of Wisconsin since August 30, 1951. These restrictions have permitted a progressive increase in the number of space heating customers from 58,580 to 71,828. Even so, only 29 per cent of the company's residential customers use gas for space heating, far below the 60 to 75 per cent range of space heating saturation in other cities.

Substantial community benefits will accrue to Milwaukee and other cities, villages, and towns in the company's service area as the number of persons who use natural gas house heating increases. Among these benefits will be a reduction in smoke and soot, a reduced load on municipal ash collection services, and a lessening of truck traffic, for natural gas "traffic" moves

President of Milwaukee Gas Light Company is an energetic, forward thinking young man, S. Lloyd Nemeyer. A former partner in the public accountant firm of Arthur Andersen and Company, he has been president of the Milwaukee utility since August, 1955.

Propane storage tank farm at Milwaukee Gas Light's West Side station. Shown are 40 of 42 tanks. Each has a 30,000-gal capacity.



Ray Jochimsen, assistant superintendent of the West Side station, inspects the four liquified petroleum vapor generators at the station. Vapor goes to holders — one of which is seen as dark mass behind generator.

Botanical greenhouse at Marquette University in Milwaukee is heated throughout Milwaukee's chill winters by a gas-fired boiler with no adverse effects on growing plants.

Alvin Fuhrman, general foreman of distribution, construction, and repair, checks pressure gage on new regulator station in northern part of company's service area.

silently and safely underground out of the path of surface congestion.

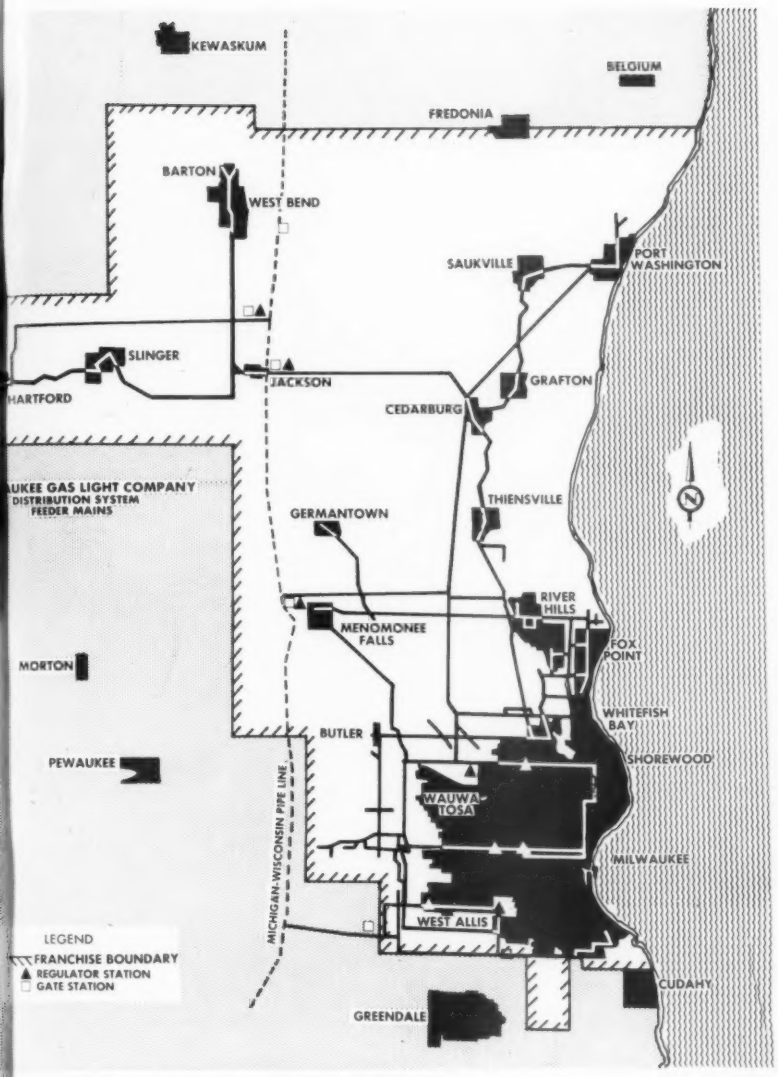
The increasing use of gas in home incinerators, too, holds the promise of lessening the growing burdens on municipal garbage and trash collection services.

The 1956 new construction program augments an existing $70,000,000 utility plant of 2150 miles of distribution mains. These mains now serve about 240,000 customers, including 72,000 space heating customers, and 1400 industrial gas consumers. The company's customers used about 57 per cent of the total volume of gas delivered in Wisconsin during 1955 by the Michigan Wisconsin Pipe Line Company, principal supplier of natural gas for Wisconsin utilities.

Milwaukee Gas Light, in serving these customers, employs about 1550 persons and operates a fleet of about 570 vehicles and motorized equipment. Main offices are at 626 East Wisconsin Avenue.

Background for the $8,500,000 construction budget is in two major pipe line projects. One is the expansion of the present facilities of the Michigan Wisconsin Pipe Line Company, and the other is the $130,000,000 project of American Louisiana Pipe Line Company that will tap the rich Louisiana and Gulf of Mexico gas fields for the benefit of Milwaukee and Wisconsin.

Milwaukee Gas Light is an affiliate of Michigan Wisconsin and American Louisiana. Together with Michigan Consolidated Gas Company and the Milwaukee Solvay Coke Company, the firms comprise the American Natural Gas Company's integrated natural gas system.



Map shows location of main supply lines in Milwaukee Gas Light Company's Service area. Principal communities are shown, along with city gas and regulator stations.

Air operated vertical auger (above) mounted on air compressor-tractor combination unit drills a 9-in. hole to 6-ft depth for anode placement. (Below) Closeup shows anode being placed in hole while midget trencher cuts connection trench for line to anode.

"Midget" trencher digs a 2½-in. trench for service installation. Small trench is adequate for services and minimizes damage to lawns.

Service Area

Milwaukee Gas Light Company distributes natural gas in a service area of about 544 sq miles that takes in all or part of four counties in southeastern Wisconsin. This metropolitan area, centered around the city of Milwaukee, has a population of more than 1,000,000 persons and includes such municipalities as West Allis, Wauwatosa, West Milwaukee, West Bend, Port Washington, and 39 others.

Industrial Customers

Natural gas is used by Milwaukee's world famous industries for everything from making beer to processing metals. Some of the Milwaukee Gas Light Company's industrial customers, and the uses to which they put natural gas include the following:

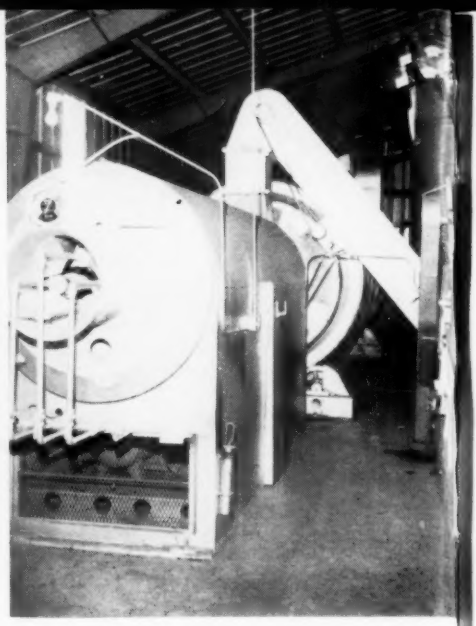
Froedtert Malt Corporation and the **Kurth Malting Company** use natural gas in curing barley for malt used in the brews that have made Milwaukee the beer capital of the world. Natural gas is superior for this use because the direct fired process demands a clean fuel and safe combustion products.

Globe Steel Tubes Company, a division of Babcock & Wilcox Company, uses natural gas in a complete steel treating process, including heat treating, forging and annealing.

Globe Union, Inc., manufacturers of batteries, small radio parts, and other products, uses natural gas in firing ceramic parts in kilns.

Nordberg Manufacturing Company uses natural gas in heat treating and in testing natural gas engines.

Other firms that use gas in a variety of metal processes include: International Harvester Company, A. O. Smith Corporation, Milwaukee Forge & Machine Company, Harley Davidson Motor Company, Chain Belt Company,



Most unusual "industrial" customer is farmer H. C. Kissinger, of Jackson, Wisconsin. Alfalfa harvested (left) is dried in gas-fired drying drums.

Continental Can Company, and American Can Company.

Several Milwaukee hospitals and dairies use natural gas for boiler fuel to provide all their steam, heat, and hot water requirements. One "industrial" customer is a farmer who uses natural gas during the summer for drying hay.

Operational Highlights

The company's sendout of gas during the 12 months ended March 31, 1956, was 257,567,598 therms, of which 240,486,445 therms were natural gas obtained from Michigan Wisconsin and the balance was manufactured gas. The maximum day's sendout occurred on December 19, 1955, and amounted to approximately 1,526,500 therms, of which approximately 1,476,000 therms were natural gas and the balance manufactured gas.

Emergency Stand-by Facilities

The company has gas generators and liquefied petroleum gas facilities with an aggregate daily production capacity approximating 345,000 therms, and gas storage holders with an aggregate capacity of 21,850,000 cu ft.

Conversions

Conversion of residential furnaces to gas heat, and the installation of natural gas heat in new residential construction, is proceeding at a rapid pace, with about 70 to 80 installations being completed per day by heating contractors.

Approximately 270 Milwaukee area dealers participate in the company's "Registered Heating Dealer" program, designed to bring the best of natural gas heating service to customers in the metropolitan area.

Training schools are held to train dealers' employees in efficient and safe installation of gas furnaces and gas conversion units. Once the dealers are qualified in the program, the company backs up their efforts with a vigorous advertising campaign and inquiries are funneled to a list of dealers on an equitable basis.

At present, Milwaukee heating dealers are working at full capacity to meet the demand for gas heat installations and conversion burner installations. The installation rate is running at better than 500 per week.

Effect of ASA B31.8-1955 Code

The ASA B31.8 code has had little effect on the Milwaukee Gas Light Company because the company has been operating under the Wisconsin code since its promulgation in 1952. The Wisconsin code is equal to or more rigorous than the ASA code, and therefore, the Milwaukee Gas Light Company designs facilities in full compliance with both codes. ★ ★ ★

MILWAUKEE GAS LIGHT COMPANY

Footage of Pipe Installed, by type

Size (inches)	Steel (feet)	Cast Iron (feet)	Plastic (feet)	Total
¾	2,374	—	—	2,374
1¼	1,736	—	—	1,736
1½	1,267	—	—	1,267
2	2,227,056	—	1295	2,228,351
2½	978	—	—	978
3	1,039,121	10,049	—	1,049,170
4	584,425	3,430,222	—	4,014,647
6	196,839	1,798,465	—	1,995,304
8	106,950	549,789	—	656,739
10	19,690	221,594	—	241,284
12	36,251	505,045	—	541,296
14	62,718	—	—	62,718
16	37,220	179,257	—	216,477
18	14,449	—	—	14,449
20	104,360	95,760	—	200,120
22	59,632	—	—	59,632
24	21,985	34,994	—	56,979
26	4,986	—	—	4,986
30	843	2,185	—	3,028
	4,522,880	6,827,360	1295	11,351,535

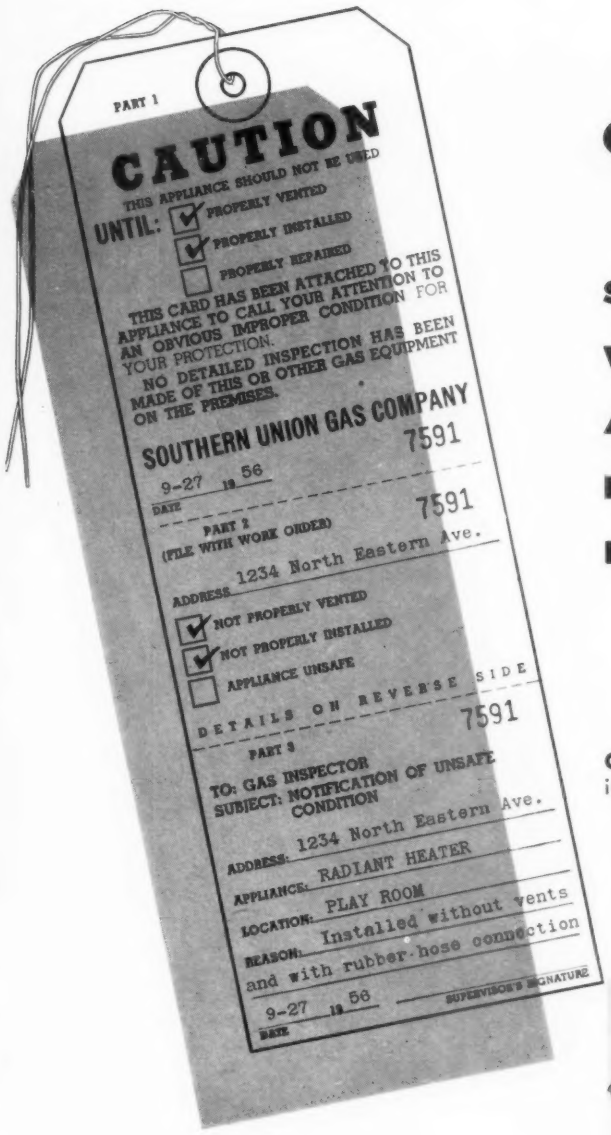
Main Crossings Installed

10	416	—	—	416
12	774	—	—	774
20	2,849	—	—	2,849
24	80	2,088	—	2,168
	4,119	2,088	—	6,207
Total Mains	4,526,999	6,829,448	1295	11,357,742*

*As of December 31, 1955.
During the first nine months of 1956, Milwaukee Gas Light Company has installed a total of 494,103 ft of steel mains in sizes ranging from 2 to 20-in.

CAUTION TAG

Serves As Warning Device Against Appliance Hazards In the Home


PART 1

CAUTION

THIS APPLIANCE SHOULD NOT BE USED UNTIL:
- [x] PROPERLY VENTED
- [x] PROPERLY INSTALLED
- [ ] PROPERLY REPAIRED

THIS CARD HAS BEEN ATTACHED TO THIS APPLIANCE TO CALL YOUR ATTENTION TO AN OBVIOUS IMPROPER CONDITION FOR YOUR PROTECTION.
NO DETAILED INSPECTION HAS BEEN MADE OF THIS OR OTHER GAS EQUIPMENT ON THE PREMISES.

SOUTHERN UNION GAS COMPANY 7591

DATE 9-27 19 56

PART 2 (FILE WITH WORK ORDER) 7591

ADDRESS 1234 North Eastern Ave.

- [x] NOT PROPERLY VENTED
- [x] NOT PROPERLY INSTALLED
- [ ] APPLIANCE UNSAFE

DETAILS ON REVERSE SIDE

PART 3 7591

TO: GAS INSPECTOR
SUBJECT: NOTIFICATION OF UNSAFE CONDITION

ADDRESS: 1234 North Eastern Ave.
APPLIANCE: RADIANT HEATER
LOCATION: PLAY ROOM
REASON: Installed without vents and with rubber-hose connection

DATE 9-27 19 56 SUPERVISOR'S SIGNATURE

Complete caution tag, showing three parts. Reverse side is printed in Spanish, but otherwise is identical to this side.

On house call, serviceman tags an unsafe radiant heater, installed without vents, and with a rubber hose connection. Before leaving, he explains the hazard to the homeowner, tells her how to have it corrected, and disconnects the appliance.

— Photos Courtesy Southern Union Gas News

A NEW "caution tag" procedure to point out hazards in customers' gas appliances and equipment has been adopted by Southern Union Gas Company in the interest of better safety measures in the homes of its 282,000 customers and their families.

The caution tag, devised by the company's Safety Advisory Panel, is already in use by company servicemen. It consists of three detachable parts. Part One is attached to the faulty appliance; Part Two goes to Southern Union's service supervisor, and Part Three is forwarded to the local gas inspector.

As explained in Southern Union's manual of standard distribution service policies, "When a serviceman finds a hazard in a customer's appliance or equipment, he will discontinue service to the appliance or equipment involved and will inform the customer of the action being taken for the cus-

Serviceman then takes Parts Two and Three of the tag to his service supervisor. Serviceman's duties require him to be alert to unsafe conditions and report them to the supervisor.

On routine visit, local gas inspector receives Part Three of the caution tag from the service supervisor. Stubs are generally mailed to the inspector daily and he investigates each case after the consumer has corrected the hazard.

tomer's own protection. If necessary, all gas service to the customer's premises may be discontinued. In either case, the serviceman's supervisor shall be promptly notified so that he may take further steps which the conditions may warrant."

The caution tag, printed in both English and Spanish, was designed to aid in each of the steps of designating hazards and correcting them.

First, it serves as a sign for the customer's family to be alert to danger. After serviceman talks with the occupant and explains what must be done to remove the danger, the tag is securely wired to the appliance so that no other member of the family will use the appliance unknowingly.

Next, Part Two of the tag is turned over to the supervisor to inform him of the situation. This center portion is attached to the work order and becomes a permanent record in the company's file.

The supervisor then signs and transmits the third part of the tag on a daily basis to the gas inspector serving that community or area, accompanied by a covering transmittal letter.

After the customer has the problem corrected, the gas inspector checks to see that the hazard was properly eliminated. If approval is given, Southern Union's serviceman goes back to the house and removes the tag.

According to the procedure manual, unsafe conditions may be classified as either hazards or potential hazards. An example of the first group is an appliance with restricted vents causing smothering of flame. Potential hazards include appliances with improperly designed or installed vents. ★

When proper venting and piping are installed, serviceman revisits the customer's home, removes the caution tag, and connects the heater.